

**installation and
operating instructions
for model SX-71
NBFM and AM
radio receiver**



the hallicrafters co.

MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

INSTALLATION AND OPERATING INSTRUCTIONS

RADIO RECEIVER MODEL SX-71

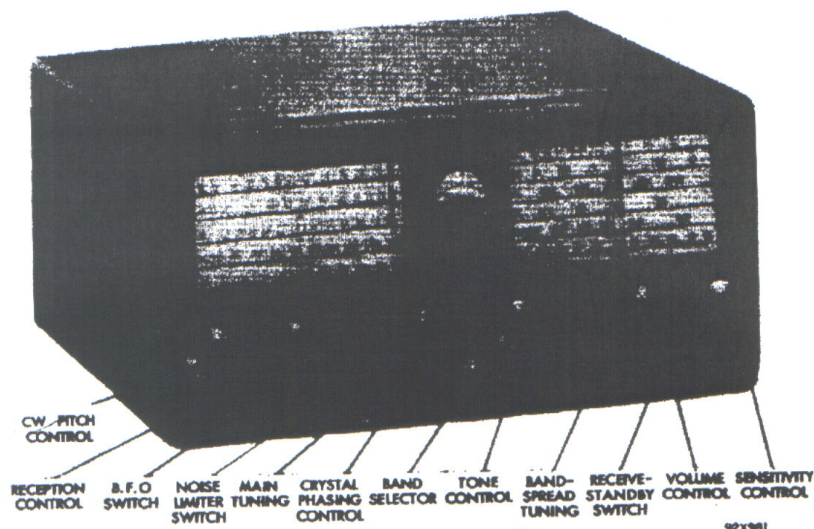


Fig. 1. Radio Receiver Model SX-71

DESCRIPTION

The Model SX-71 radio receiver is a sensitive communications type superheterodyne receiver covering the 160, 80, 40, 20, 10 and 6 meter amateur bands in its frequency range of 560 kilocycles (KC) to 56 megacycles (MC). The receiver is designed for reception of CW (Code) signals, narrow band frequency modulated (NBFM) signals and amplitude modulated (AM) broadcasts over its entire frequency range as follows;

FREQUENCY COVERAGE

Band	# Frequency Range	Type of Reception
1	560 KC - 1600 KC	AM/NBFM/CW
2	1650 KC - 4700 KC	AM/NBFM/CW
3	4.7 MC - 13.4 MC	AM/NBFM/CW
4	12.8 MC - 34 MC	AM/NBFM/CW
5	46 MC - 56 MC	AM/NBFM/CW

AM - Amplitude Modulation
CW - Code

NBFM - Narrow Band Frequency Modulation
First and last dial calibration

For maximum ease and flexibility of operation, two extra-wide slide-rule dials calibrated directly in frequency of reception are used. One provides for general coverage over the frequency range 560 KC to 34 MC, and the other is a bandspread dial calibrated specifically for the 80, 40, 20, 10 and 6 meter amateur bands.

The use of a double conversion circuit, improves selectivity and provides better image rejection than in the conventional superheterodyne receiver.

For the ultimate in selectivity, a variable crystal filter and a crystal phasing control are used so that the receiver can be peak adjusted for that hard-to-read signal.

The audio system provides sufficient audio power to operate either headphones or speaker. A phono jack permits operation of the audio amplifier as a separate unit.

An automatic noise limiter operated by a toggle switch, permits the operator to reduce the background noise caused by severe electrical disturbances.

A RECEIVE-STANDBY switch permits receiver disabling for short standby periods without having to wait for the tube heaters to reach operating temperature when reception is again required.

The receiver normally operates from a 105-125 volt 50/60 cycle alternating current (AC) source. A connector for operating the receiver with external batteries or equivalent power is provided to permit operation in areas where AC current does not exist. A universal model of the SX-71 receiver permits operation from 25/60 cycle alternating current sources and at voltages ranging from 105 to 250 volts. The power requirements for your receiver must be checked carefully. Read over the installation section of this book and check the labels on the receiver before connecting to your power source.

INSTALLATION

UNPACKING - Check all shipping instruction tags carefully before removing them.

LOCATION - The receiver is equipped with rubber feet for table top or shelf mounting. It is important that the receiver have proper ventilation because overheating may cause excessive frequency drift. Therefore, avoid placing the receiver in excessively warm locations such as near radiators, hot air registers, or confined dead air spaces such as are encountered in recessed installations. Note also that the top cover of the receiver is made of perforated metal to provide proper ventilation of the chassis. Do not block free circulation of air by placing loudspeaker, log book, clocks, etc. on this cover.

This receiver has an extremely high degree of IF selectivity. For this reason it is best to locate the loudspeaker 12" to 18" from the receiver to avoid the possibility of acoustical or mechanical coupling between the two, a condition which would be evidenced by howl or feedback at the higher volume levels.

POWER SOURCE - Two types of power sources may be used to operate the receiver. The receiver may be operated directly from an AC source or indirectly from a battery or DC source as follows:

AC Operation - The receiver, as normally supplied, operates from a 105 to 125 volt, 50/60 cycle AC outlet. Power consumption is approximately 90 watts. If you are in doubt or unfamiliar with the voltage and frequency rating of your utility service, consult your local power company representative. Attempting to operate the receiver from other sources of power than specified may involve costly repairs.

A universal model is available for operation from 115 V./130 V./150 V./220 V./250 V. 25/60 cycle AC sources. A selector switch on the power transformer permits operation on any of the line voltages shown.

CAUTION - When operating the universal model, it is essential to check, and if necessary, to set the selector switch on the power transformer before connecting the receiver to the source of power.

Note - The receiver will not operate from an AC source unless the jumper plug is inserted in its BATTERY POWER receptacle. (See Fig. 3.).

DC Operation - The receiver may be operated from a 6-volt DC source (storage battery or equal) and a 270-volt DC supply in the form of "B" batteries, vibrator power pack, or motor generator set. The DC source must be capable of supplying the following voltages and currents for optimum results.

"B" voltage	270 Volts
"B" current110 Milliamperes
Heater voltage	6.3 Volts
Heater current	4.4 Amperes

Total current drain, when operating entirely from a storage battery (Vibrator type supply), will run approximately 15 amperes.

DC power is connected to the receiver through the octal socket located on the rear apron of the chassis. The jumper plug normally in this socket for AC operation is replaced with a standard octal plug for DC operation.

Wire the octal plug for DC operation as shown in Fig. 2.

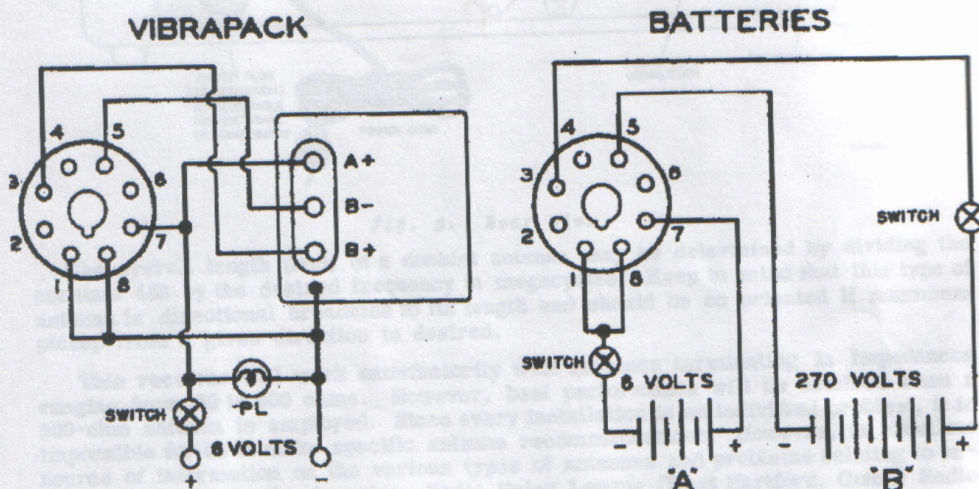


Fig. 2. Wiring diagram, DC power plug.

SPEAKER CONNECTION - Three screw type terminals, located on the rear chassis apron, are provided for the speaker connections. The output impedances available are 3.2 and 500 ohms. Any suitable speaker unit which will operate with either of these output impedances may be used with the Model SX-71 receiver.

ANTENNA - A three terminal strip marked "A1", "A2" and "G" is located at the rear chassis apron for antenna connections. This terminal arrangement will accommodate either a single wire antenna lead-in or an antenna transmission line.

Single Wire Antenna - For a single wire antenna installation, connect a jumper between the antenna terminals "A2" and "G". A single wire antenna about 50 to 100 feet long (including lead-in) is then connected to terminal "A1". Erect the antenna as high and free from surrounding objects as possible. This type of antenna must be well insulated from ground for best results. It may be desirable in some installations to connect a ground wire between terminal "G" and a suitable ground such as a water pipe or outside ground stake.

Doublet Antenna - The doublet antenna is recommended for the high frequency bands, especially where a maximum signal to noise level is required over a relatively narrow range of frequencies. The antenna transmission line is connected to terminals "A1" and "A2". If a concentric line with a grounded outer conductor is used, connect the inner conductor to terminal "A1" and outer conductor to terminal "A2", and connect a jumper wire between terminals "A2" and "G".

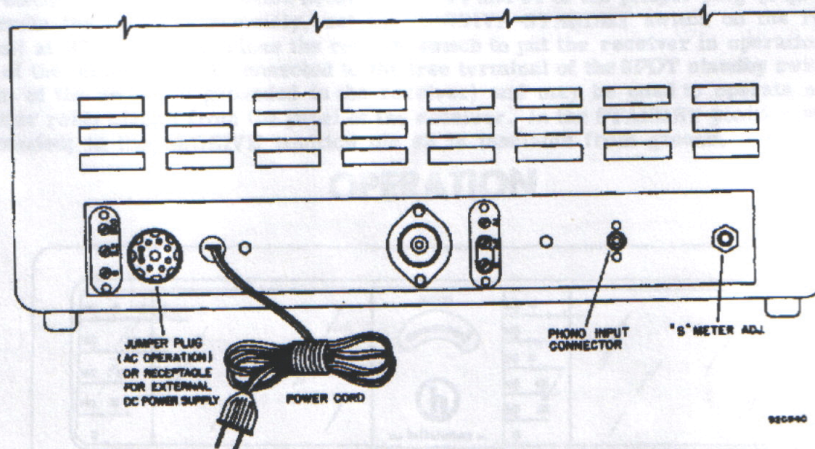


Fig. 3. Rear view.

The overall length (feet) of a doublet antenna may be determined by dividing the constant 468 by the desired frequency in megacycles. Keep in mind that this type of antenna is directional broadside to its length and should be so oriented if maximum pickup from a given direction is desired.

This receiver will work satisfactorily with antennas terminating in impedances ranging from 50 to 600 ohms. However, best performance will be obtained when a 300-ohm antenna is employed. Since every installation is an individual problem, it is impossible for us to make specific antenna recommendations. However, an excellent source of information on the various types of antennas and problems relating to antenna installation is the American Radio Relay League (West Hartford, Conn.) Radio Amateur's Handbook.

RECORD PLAYER CONNECTION - A shielded type receptacle is provided at the rear chassis apron to accommodate a record player pickup cable connector. Any record player employing a crystal cartridge or high level magnetic pickup in its tone arm may be used with the receiver. Refer to Fig. 4 for wiring details.

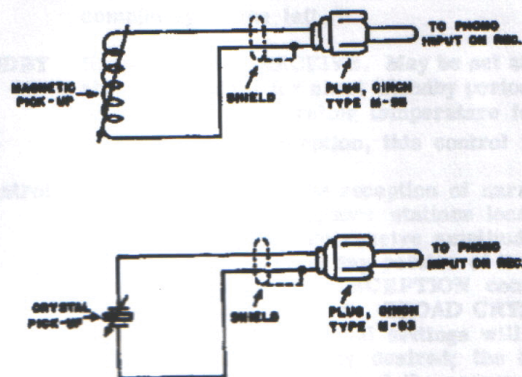
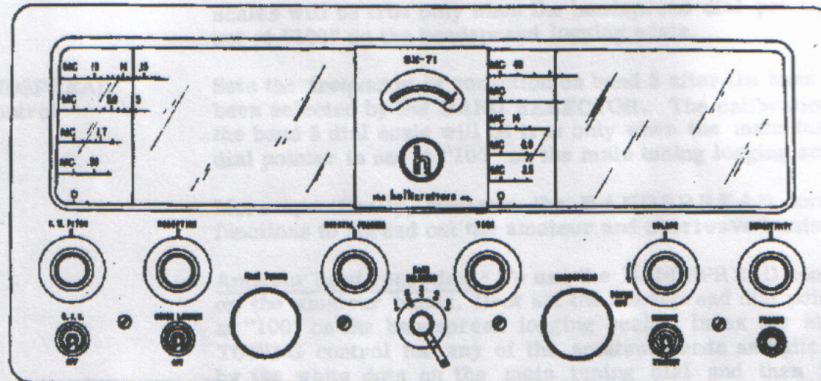


Fig. 4. Wiring diagram, record player connection.

OPERATION



RADIO TELEPHONE RECEPTION - To receive amplitude modulated (AM) or narrow band frequency modulated (NBFM) radio telephone signals, the following use of the controls is recommended to obtain maximum performance from the MODEL SX-71 receiver.

This control turns the receiver on and off in addition to controlling the volume. Turn the control clockwise to turn on the receiver or increase volume and counter-clockwise to reduce volume. To turn off the receiver, turn the control completely to the left.

Normally set at **RECEIVE**. May be set at **STANDBY** to disable the receiver for short standby periods and yet keep the tube heaters at operating temperature for instant use.

For radio phone reception, this control is set at OFF.

Set at N.B.F.M. for the reception of narrow band frequency modulated radio telephone stations located in any of the short wave bands. To receive amplitude modulated radio telephone signals over any portion of the frequency range, three positions of the RECEPTION control may be used; these are, NORMAL I.F., BROAD CRYSTAL, and SHARP CRYSTAL. The individual settings will be determined by the degree of selectivity desired; the broadest bandwidth is under NORMAL I.F. and the narrowest, under SHARP CRYSTAL. The use of the crystal filter will require an adjustment of the CRYSTAL PHASING control. Refer to "USE OF CRYSTAL PHASING CONTROL" for details.

BAND SELECTOR
control

Set for the desired position as indicated by the band number on the dial scale. Bands 1 through 4 are found on the left hand or main tuning dial and band 5 is on the right hand or bandspread dial.

MAIN TUNING
control

Sets the frequency of reception on bands 1 through 4 after the individual band has been selected by the BAND SELECTOR. Frequencies of all bands are shown in megacycles (MC).

IMPORTANT - The calibrations on the main tuning dial scales will be true only when the bandspread dial pointer is set at "100" on the bandspread logging scale.

BANDSPREAD
control

Sets the frequency of reception on band 5 after the band has been selected by the BAND SELECTOR. The calibration of the band 5 dial scale will be true only when the main tuning dial pointer is set at "100" on the main tuning logging scale.

More specifically, however, the BANDSPREAD control functions to spread out the amateur and shortwave bands.

Amateur band reception - To use the BANDSPREAD control on the amateur bands, first set the bandspread dial pointer at "100" on the bandspread logging scale. Index the MAIN TUNING control for any of the amateur bands as indicated by the white dots on the main tuning dial and then tune through the band with the BANDSPREAD control.

Short Wave reception - To tune the shortwave broadcast stations with the BANDSPREAD control; set the bandspread dial pointer at "100"; set the main tuning dial pointer slightly higher in frequency than the desired group of short wave stations and then tune in the stations with the BANDSPREAD control. Note that the frequency of reception cannot be read directly from either set of dial scales for general short wave reception. However, short wave stations may be logged by recording the two dial pointer settings with the logging scales.

SENSITIVITY
control

Normally set maximum clockwise. The control must be set maximum clockwise for correct "S" meter operation.

TONE control

Set at 10 for normal response. Turn in a counter-clockwise direction to attenuate the high frequency audio response.

NOISE LIMITER
Switch -

Normally set at "OFF". Where natural or "man-made" static interferes with reception this switch may be set at NOISE LIMITER to reduce the interference. See Fig. 6.

CW (Code) RECEPTION - To receive code transmissions the following use of the receiver controls is recommended:

B.F.O. switch -

Set at B.F.O. for CW reception.

C.W. PITCH control -

After the code signal has been tuned in, this control can be adjusted to the tone pitch that is most pleasing to the ear of the operator.

VOLUME control - Same as for RADIO TELEPHONE RECEPTION.

RECEIVE/STANDBY switch - Same as for RADIO TELEPHONE RECEPTION

BAND SELECTOR control - Same as for RADIO TELEPHONE RECEPTION.

MAIN TUNING control - Same as for RADIO TELEPHONE RECEPTION.

BANDSPREAD control - Same as for RADIO TELEPHONE RECEPTION

RECEPTION control - Set for NORMAL I.F. If a greater selectivity is desired, this control should be set for BROAD CRYSTAL or SHARP CRYSTAL. The use of the crystal filter will require an adjustment of the CRYSTAL PHASING control. Refer to "USE OF CRYSTAL PHASING CONTROL" for details.

TONE control - Set at 0 for code reception

SENSITIVITY control - The receiver sensitivity must be controlled manually for code reception, hence the SENSITIVITY control must be advanced just enough to keep the code stations from blocking the receiver.

NOISE LIMITER switch - The noise limiter circuit is particularly useful for code reception because it "clips" the intermittent noise peaks down to the level of the desired signal where they tend to become unnoticeable. See Fig. 6, for an illustration of limiter action.

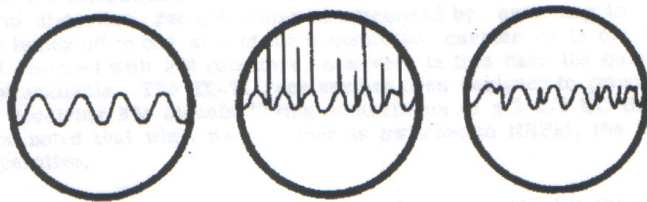


Fig. 6. Noise limiter action.

USE OF CRYSTAL PHASING CONTROL - This control permits the discrimination of interfering signals whose frequencies are very near the desired signal. To attain single signal reception with the SX-71, first set the RECEPTION switch to either BROAD CRYSTAL or SHARP CRYSTAL. Choose a strong signal, preferably a commercial station because a commercial is likely to stay on long enough for you to complete the phasing adjustment for single signal reception.

You will find on tuning across this signal that it has two amplitudes. Now turn the CRYSTAL PHASING control until the weaker of the two amplitudes is reduced to a minimum. Then, tune to the stronger of the two amplitudes and adjust the PITCH control (for c-w reception) to a tone most pleasing to you. This adjustment for single signal selectivity will require no further adjustment unless you change the phasing control. See Fig. 7, for an illustration of single signal operation.

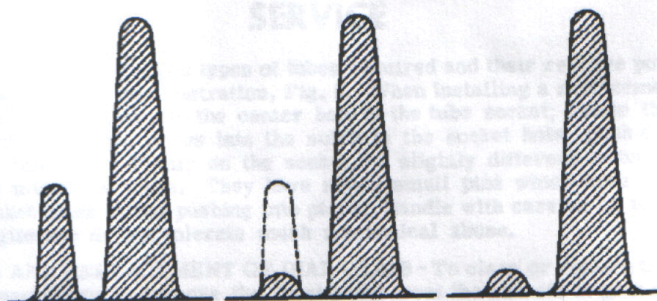


Fig. 7. Single signal operation.

USE OF THE "S" METER - The "S" meter or tuning meter functions when the receiver is set up for amplitude modulated radio telephone reception and provides a means for setting the receiver "dead on" the carrier frequency and gives a relative reading of received signal strength. A true "S" meter reading is obtained only when the SENSITIVITY control is set for maximum sensitivity (max. clockwise rotation) and the receiver is tuned for the maximum meter reading.

The meter circuit is disabled for code or narrow band FM reception.

NOTES ON NBFM RECEPTION - When tuning in amateur radiophone stations using narrow band frequency modulation, tune for minimum distortion. Note that in general, the headset or speaker volume is slightly less than for AM phone reception. This is normal. However, when the volume level is very low, it indicates that the deviation of the FM signal is considerably below $\pm 2\frac{1}{2}$ KC. When the received signal is loud and very distorted, the transmitted signal has a deviation in excess of $\pm 2\frac{1}{2}$ KC. In extreme cases of distortion, reception may be attempted by switching to normal AM reception and tuning off to one side of the transmitted carrier as is customary with receivers not equipped with FM detectors, however, in this case the quieting effects of FM are not available. The SX-71 receiver has been designed to provide optimum results when receiving FM signals having a maximum of $\pm 2\frac{1}{2}$ KC deviation. It should also be noted that when the receiver is switched to NBFM, the "S" meter is rendered inoperative.

RECORD PLAYER OPERATION - With a record player connected to the receiver it is merely necessary to set the RECEPTION control at PHONO and operate the VOLUME and TONE controls as for normal radio reception.

CAUTION - The receiver will not respond if the RECEIVE/STANDBY switch is set at STANDBY. The setting of the remaining controls, except those mentioned above, is immaterial as they are not in use for record player operation.

HEADPHONE OPERATION - A headset jack located on the front panel, provides for headphone reception. Insertion of the headset plug disables the speaker. Any standard headset of low or medium impedance can be used with this receiver.

The Hallicrafters Co. reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.

SERVICE

TUBE REPLACEMENT - The types of tubes required and their relative position in the receiver are shown in the illustration, Fig. 8. When installing a replacement tube, insert the center guide pin into the center hole of the tube socket; rotate the tube until the key on the guide pin drops into the notch in the socket hole; push down until the base of the tube rests firmly on the socket. A slightly different technique must be used on the miniature tubes. They have seven small pins which have to be lined up with the socket holes before pushing into place. Handle with care as all tubes are considered fragile and do not tolerate much mechanical abuse.

CLEANING AND REPLACEMENT OF DIAL GLASS - To clean or replace the dial glass, it will be necessary to remove the front panel from the chassis to gain access to the glass. To do this, first remove all knobs and hex nuts holding the potentiometers and jacks to the panel. Then remove the four screws from the front of the panel and the screws on the side and bottom. The front panel can then be removed from the chassis.

SERVICE OR OPERATING QUESTIONS - Factory type service is available at Hallicrafters Authorized Field Service Centers. For Warranty Service information or further details regarding operation or servicing of the receiver in general, contact the dealer directly. Make no service shipments directly to the factory before first writing for authorization and instructions. The factory cannot accept responsibility for unauthorized shipments.

SERVICE LITERATURE - If a service manual was not packed with this receiver, advise the Hallicrafters Company on the guarantee card and one will be forwarded.

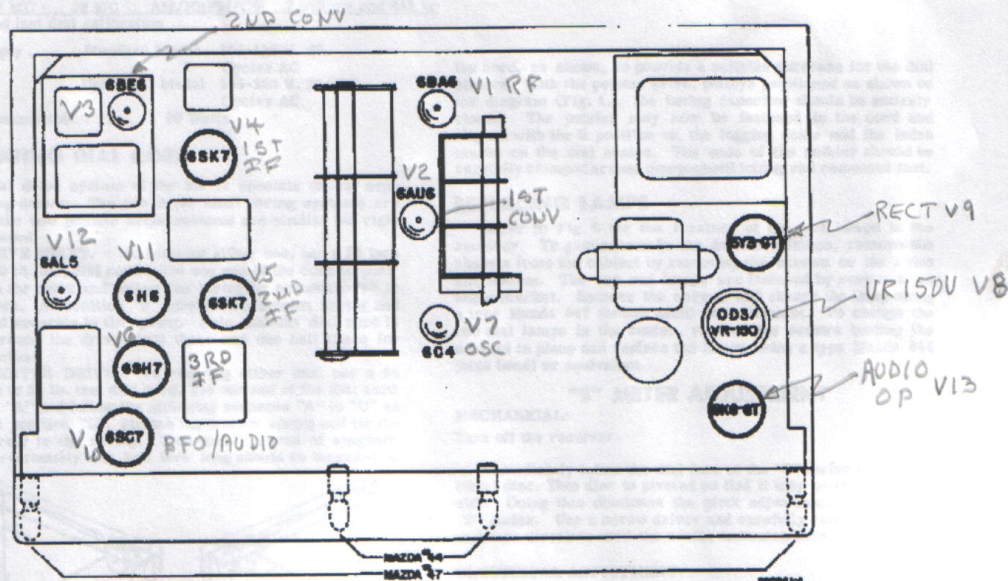


Fig. 8. Top view showing location of tubes and dial lamps.

DIAL LAMP REPLACEMENT - Refer to Fig. 8 for the location of the dial lamps in the receiver. Access to defective lamps, may be gained through the top cabinet cover. The two end lamps are fastened by screws to an angle bracket. Remove the screws and change the lamp using a 6-8 V. Mazda #47 (brown bead) or equivalent. To change the two dial lamps in the center, it is necessary to unscrew the two screws holding the sockets in place. These two lamps should be replaced with 6-8 V. Mazda #44 (blue bead) or equivalent.

the hallicrafters co.

SERVICE BULLETIN FOR MODEL SX-71

DEC., 1950
FORM 941300
RUM NO. 3
SEE CHASSIS
STAMP

GENERAL

Tubes eleven plus voltage regulator and rectifier
Speaker Output 3.5/500 ohms
Headset Output 500 ohms
Antenna Input For 50 to 600 ohm line or single wire lead-in.
Phono Input High impedance
External Power Connector Std. octal socket

TUNING RANGE

Band	*Frequency Range	Type of Reception	Intermediate Frequency
1	560 KC - 1600 KC	AM/NBPM/CW	455 kc
2	1850 KC - 4700 KC	AM/NBPM/CW	455 kc
3	4.7 MC - 13.4 MC	AM/NBPM/CW	2.075 mc and 455 kc
4	12.8 MC - 34 MC	AM/NBPM/CW	2.075 mc and 455 kc
5	46 MC - 58 MC	AM/NBPM/CW	2.075 mc and 455 kc

* First and last dial calibration

Power Supply Standard Model 105-125 V. 60 Cycles AC
Universal Model 105-250 V. 35/130 Cycles AC

Power Consumption 90 Watts.

RESTRINGING DIAL CORD

The dial drive system of the SX-71 consists of four separate spring drives. The two drive shaft string systems are identical; the two pointer drive systems are similar but right and left handed.

(1) DRIVE SHAFT. - To restring either one, use a 28 inch length of 30 lb. test dial cord. Tie one end of the cord to position "1" on the drum and follow the stringing sequence "1" to "B" as shown. At position "B" stretch the tension spring and tie the cord securely to the spring. Note that the dial cord is wrapped around the drive shaft three and one half times for proper traction.

(2) POINTER DRIVE - To restring either one, use a 66 inch length of 30 lb. test dial cord. Tie one end of the dial cord to position "A" and follow the stringing sequence "A" to "U" as shown. At position "U", stretch the tension spring and tie the cord securely to the spring. Two small pieces of spaghetti tubing approximately one half inch long should be threaded on

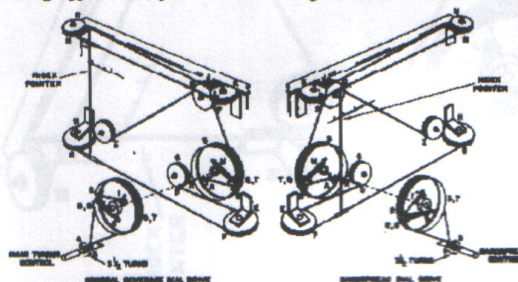
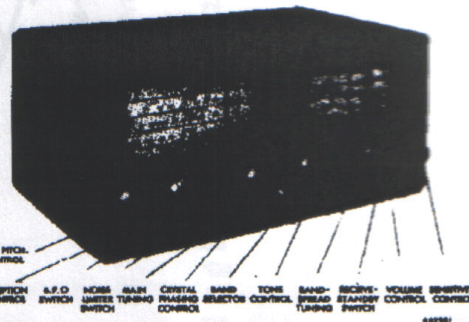


Figure 1. Dial cable stringing procedure



the cord, as shown, to provide a suitable purchase for the dial pointer. With the pointer drive, pulleys positioned as shown on the diagram (Fig. 1.), the tuning capacitor should be entirely closed. The pointer may now be fastened to the cord and aligned with the 0 position on the logging scale and the index marks on the dial scales. The ends of the pointer should be carefully crimped around the spaghetti tubing and cemented fast.

REPLACING LAMPS

Refer to Fig. 8 for the location of the dial lamps in the receiver. To gain access to the defective lamps, remove the chassis from the cabinet by removing the screws on the sides and bottom. The two end lamps are fastened by screws to an angle bracket. Remove the screws and change the lamp using a type Mazda #47 (brown bead) or equivalent. To change the two dial lamps in the center, remove the screws holding the sockets in place and replace the lamps using a type Mazda #44 (blue bead) or equivalent.

"S" METER ADJUSTMENT

MECHANICAL:

Turn off the receiver.

Immediately below the dial face of the "S" meter is a round metal disc. This disc is pivoted so that it may be moved to one side. Doing this discloses the pivot adjustment screw of the "S" meter. Use a screw driver and carefully rotate the screw in either direction until the needle indicates zero.

ELECTRICAL ADJUSTMENT:

Turn the receiver on.

Set the RECEIVE STANDBY switch at RECEIVE.

Set BFO at OFF.

Set the SENSITIVITY control at maximum.

Set the NOISE-LIMITER at OFF.

Short the antenna terminals to ground.

The "S" meter adjustment control is located on the left rear apron of the chassis. Turn this control slowly until the needle in the "S" meter indicates zero.

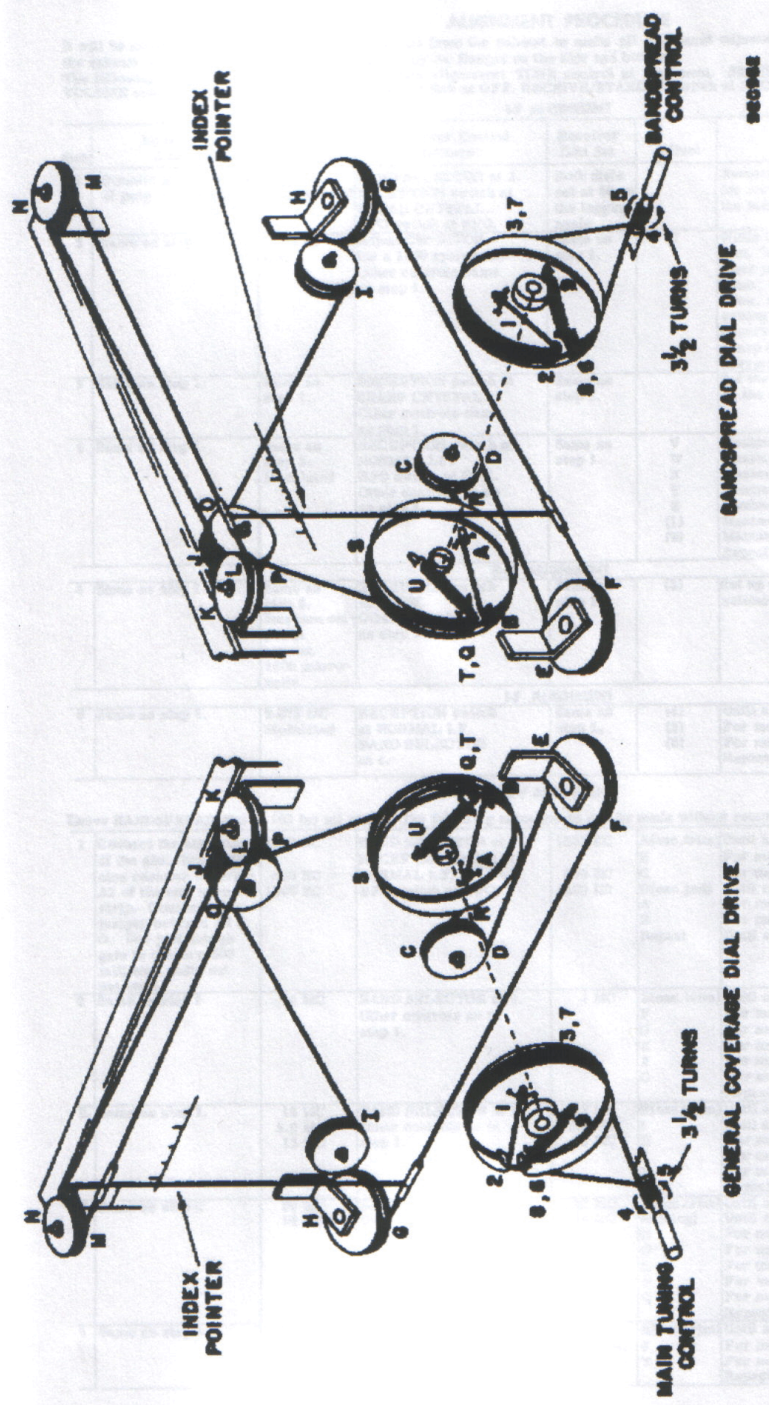


Figure 1. Dial cable stringing procedure

ALIGNMENT PROCEDURE

It will be necessary to remove the receiver chassis from the cabinet to make all alignment adjustments. The chassis is held in the cabinet by two screws on the bottom rear and by the flanges on the side and bottom.
The following control settings are to be set before alignment: TONE control at maximum. SENSITIVITY control at maximum. VOLUME control at maximum. NOISE LIMITER switch at OFF. RECEIVE/STANDBY switch at RECEIVE.

I-F ALIGNMENT

Step	Signal Gen. Coupling	Signal Gen. Frequency	Receiver Control Settings	Receiver Dial Set	Adjust	Remarks
1	Connect gen. to stator of gang, mixer sect.	455 KC Unmodulated	BAND SELECTOR at 2. RECEPTION switch at BROAD CRYSTAL. BFO switch at BFO.	Both dials set at 50 on the logging scale		Remove CW PITCH control knob and set shaft for zero beat. Replace knob with the zero at the index line.
2	Same as step 1.	Same as step 1.	Adjust CW-PITCH for a 1000 cycle note. Other controls same as step 1.	Same as step 1.	U	While turning the slug very slowly in one direction, "rock" the signal generator. As the adjustment passes thru the response of the crystal filter, the output goes thru a maximum, dips down, and starts going up again. The correct setting of this slug is in the center of the observed dip. A swishing note, in contrast to the sharp crystal tone will be apparent when the correct adjustment has been reached.
3	Same as step 1.	Same as step 1.	RECEPTION switch at SHARP CRYSTAL. Other controls same as step 1.	Same as step 1.		Set the generator frequency for maximum output on the crystal frequency.
4	Same as step 1.	Same as step 3. Modulated	RECEPTION switch at NORMAL I.F. BFO switch at OFF. Other controls same as step 1.	Same as step 1.	W X Y Z (1) (2)	Maximum output Maximum output Maximum output Maximum output Maximum output Maximum output Repeat above until maximum gain is obtained.

F-M ALIGNMENT

5	Same as step 1.	Same as step 3. Increase output to approx. 1000 microvolts.	RECEPTION switch at NBPM. Other controls same as step 1.	Same as step 1.	(3)	Set up circuit shown in Fig. 2. Until vacuum tube voltmeter shows zero voltage.
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I-F ALIGNMENT

6	Same as step 1.	2.075 MC Modulated	RECEPTION switch at NORMAL I.F. BAND SELECTOR at 4.	Same as step 1.	(4) (5) (6)	Until a signal is heard. For maximum output. For maximum output. Repeat until the maximum output is obtained.
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R-F ALIGNMENT

Leave BANDSPREAD dial at 100 for all steps. The following adjustments can be made without removing the chassis from the cabinet.

1	Connect the high side of the gen. thru a 300 ohm resistor to term. A1 of the ant. term. strip. Connect a jumper between A2 & G. Use just enough gain to obtain a 500 milliwatt audio output level.	1500 KC 600 KC 1500 KC	BAND SELECTOR at 1. RECEPTION switch at NORMAL I.F. BFO switch at BFO	1500 KC 600 KC 1500 KC	A(oc.trim) B C D(oc.pad) A B Repeat	Until a signal is heard. For maximum output. For maximum output. Until a signal is heard. For maximum output. For maximum output Until maximum output is obtained.
2	Same as step 1	4 MC	BAND SELECTOR at 2. Other controls as in step 1.	4 MC	E(oc.trim) F G E F G	Until a signal is heard. For maximum output For maximum output For maximum output For maximum output For maximum output Repeat until maximum output is obtained
3	Same as step 1.	12 MC 5.3 MC 12 MC	BAND SELECTOR at 3. Other controls as in step 1.	12 MC 5.3 MC 12 MC	H(oc.trim) I H J K	Until a signal is heard Until a signal is heard For maximum output. ("Rock" the gang) For maximum output. ("Rock" the gang) For maximum output. ("Rock" the gang) Repeat until maximum results are obtained.
4	Same as step 1	30 MC 14 MC	BAND SELECTOR at 4. Other controls as in step 1.	30 MC 14 MC	L(oc.trim) M (slug) N O L P Q	Until a signal is heard. Until a signal is heard. For maximum output. ("Rock" the gang) For maximum output. ("Rock" the gang) For maximum output. ("Rock" the gang) For maximum output. ("Rock" the gang) For maximum output. ("Rock" the gang) Repeat until maximum results are obtained.
5	Same as step 1.	54 MC	BAND SELECTOR at 5. Other controls as in step 1.	100 on logging scale.	R(oc.trim) S T	Until a signal is heard. For maximum output. ("Rock" the gang) For maximum output. ("Rock" the gang) Repeat until maximum results are obtained.

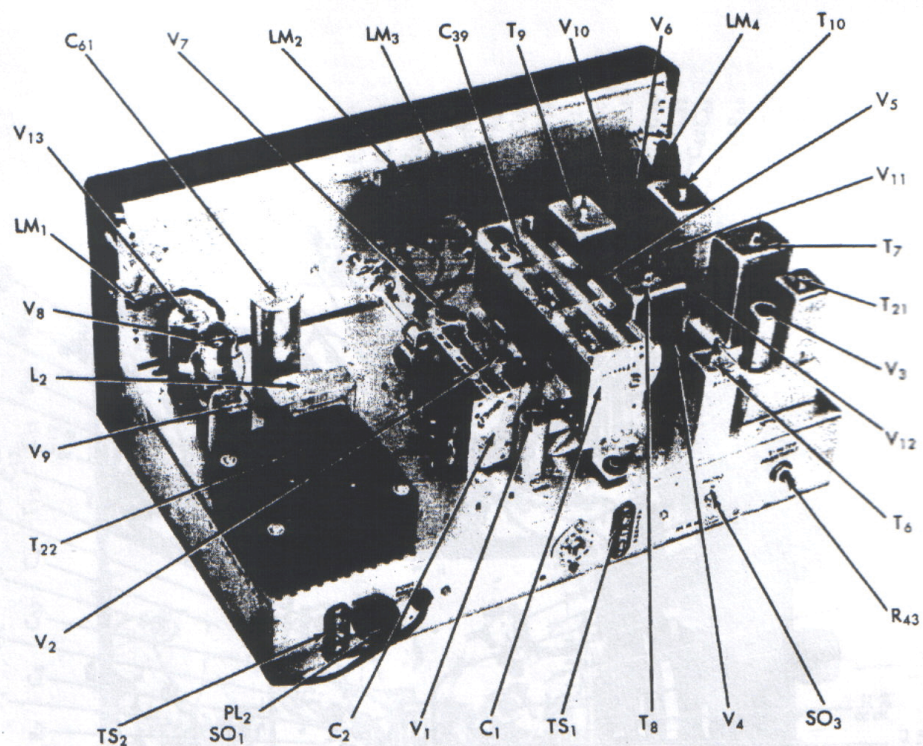


Fig. 5. Component locations, top view

92X966

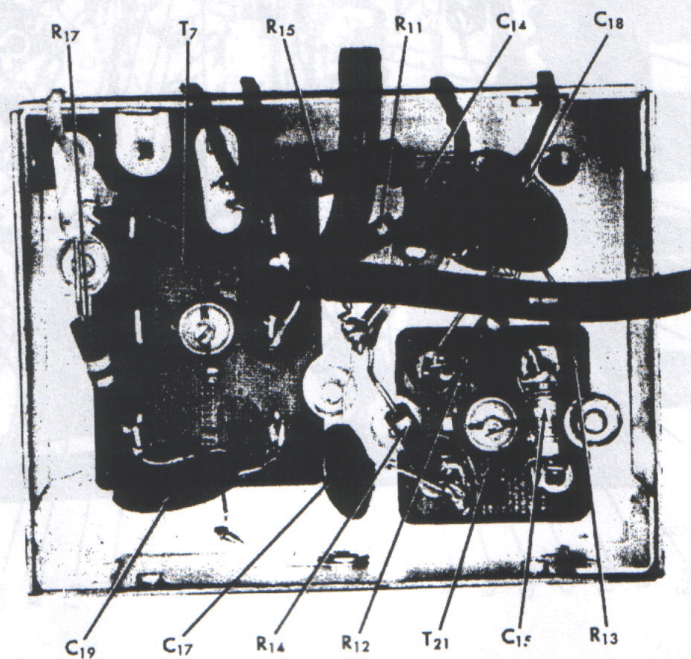


Fig. 6. Component locations, bottom view second converter unit

92X1075

PERFORMANCE DATA FOR SERVICE ENGINEERS

If this receiver is to continue giving the fine performance of which it is capable, only experienced service engineers should repair and realign it. It is essential that the equipment and methods used be comparable with those set forth by the Institute of Radio Engineers in their "Standards of Radio Receivers". The necessary data on receiver performance is given below:

Standard conditions are as follows unless otherwise specified:

Measurement conditions are as follows unless otherwise specified:
 Modulation - 30% at 400 cycles - - - Output - 50 milliwatts into 500 ohms.
 Dummy antenna - Standard IRE on bands 1 & 2, 300 ohms on bands 3, 4, and 5.

FREQUENCY RANGE		ON EACH BAND
Band - 1	.538 mc to 1.85 mc	Band - 4 - 12.5 mc to 35 mc
Band - 2	1.8 mc to 4.8 mc	Band - 5 - 40.0 mc to 56 mc
Band - 3	4.8 mc to 13.5 mc	

OVERALL BANDWIDTHS
At the IF frequency of 2075 kc. bandwidth at 6 DB down is 3.5 kc. at 80 DB - 14 kc.
At the IF frequency of 2075 kc. (Broad Xtal) 6 DB down is .7 kc. at 80 DB - 11 kc.
At the RF frequency of 1000 kc. (Reception Normal) bandwidth at 6 DB down is 3.3 kc and at 80 DB down is 13 kc.

Plus or minus 5 DB from 100 to 3000 cycles.

Modulator Stage (Osc working:
set tuned to 3 mc)

IF AMPLIFIER GAIN (400 kc) AND BANDWIDTH			
Modulator Stage (One working: set tuned to 3 mc)	1st IF Amplr.	2nd IF Amplr.	3rd IF Amplr.
Gain	15 X	29 X	24 X
At 6 DB down	6 kc	6 kc	20 kc
At 20 DB down	15 kc	16 kc	125 kc

For 2 microvolts input, the signal to noise ratio is not less than 10 DB.

GENERAL PERFORMANCE				SINGLE STAGE CHARACTERISTICS			GENERAL PERFORMANCE				SINGLE STAGE CHARACTERISTICS		
Band	MC	uv	Image Ratio	Antenna Gain	RF Gain	Osc (Conv Gain)	Band	MC	uv	Image Ratio	Antenna Gain	RF Gain	Osc (Conv Gain)
1	.600	12	24,000 X	3.4 X	2.9 X	14 X	4	14.0	*	1,500 X	1.3 X	8.0 X	12 X
	1.000	6.6	7,000 X	3.5 X	3.5 X	13 X		24.0	*	180 X	1.7 X	8.5 X	14 X
	1.500	3.3	1,800 X	3.6 X	3.5 X	12 X		30.0	1	100 X	1.7 X	8.1 X	9 X
2	1.8	1.8	28,000 X	4.7 X	3.3 X	18 X	5	48.0	1	36 X	1.8 X	8.6 X	13 X
	3.2	*	1,000 X	4.9 X	6.1 X	18 X		54.0	*	20 X	1.9 X	7.7 X	10 X
	4.0	*	300 X	4.7 X	7.3 X	16 X							
3	5.2	2.4	8,800 X	1.9 X	7.1 X	10 X							
	8.0	1.4	2,500 X	2.6 X	7.8 X	12 X							
	12.0	*	570 X	3.8 X	7.7 X	12 X							

* - Less than one microvolt

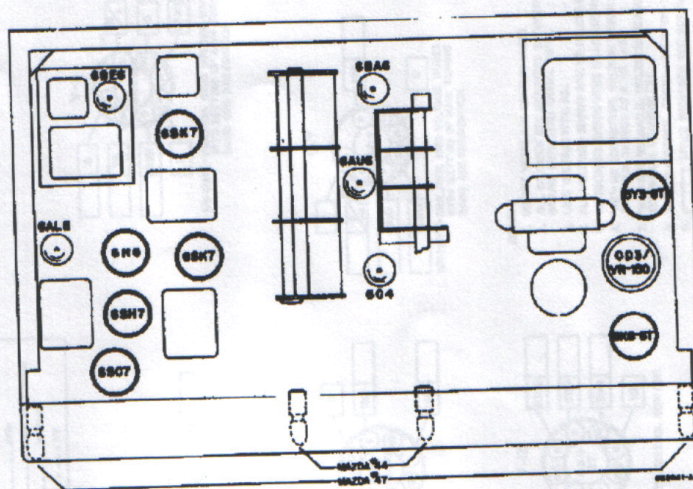
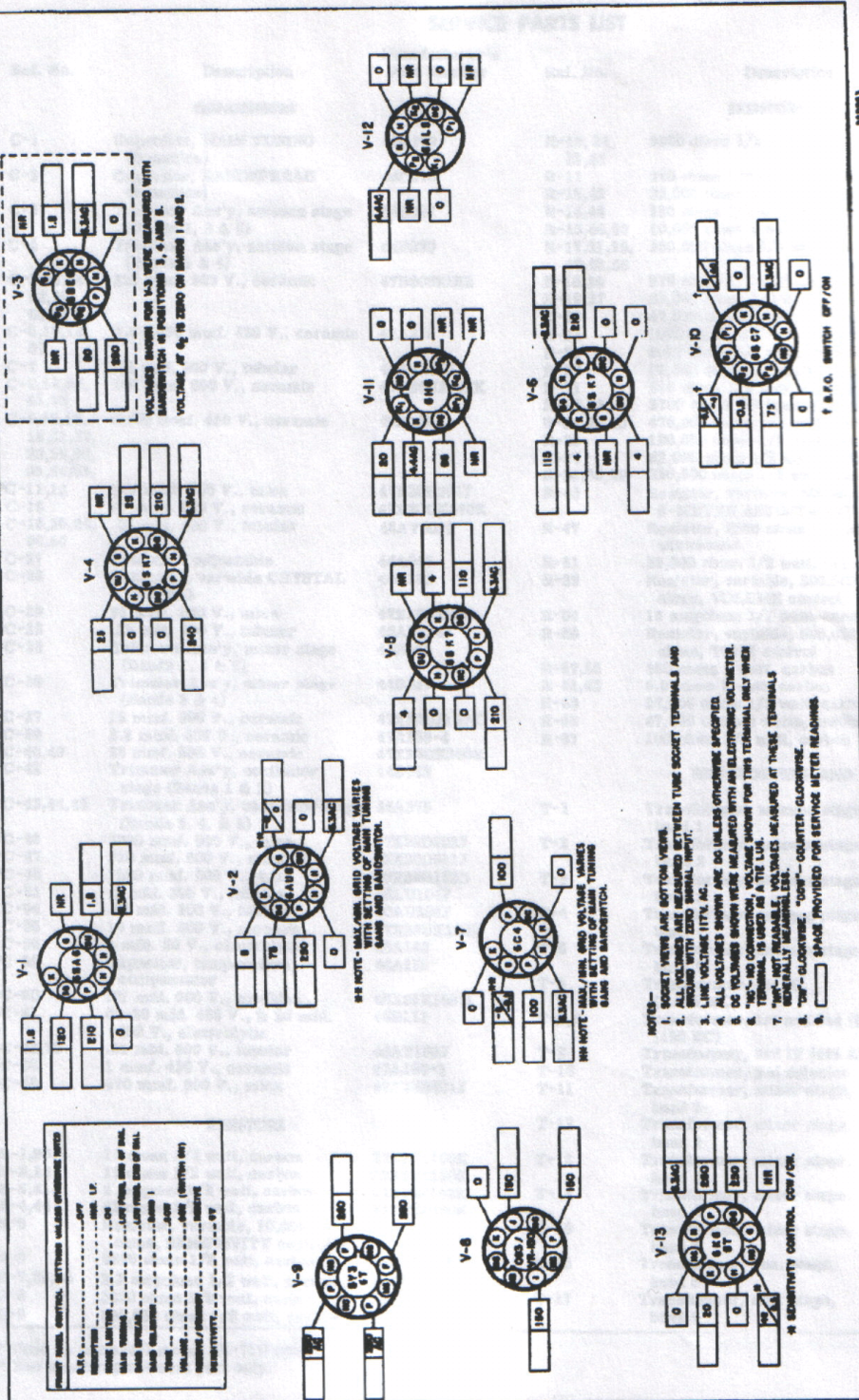


Fig. 8. Top view, location of tubes and dial lamps



SERVICE PARTS LIST

Ref. No.	Description	Manufacturer's Part Number	Ref. No.	Description	Manufacturer's Part Number
CONDENSERS			RESISTORS (Cont.)		
C-1	Capacitor, MAIN TUNING (3 section)	48D209	R-10, 24, 28, 42	3300 ohms 1/2 watt, carbon	25X20X352K
C-2	Capacitor, BANDSPREAD (3 section)	48C210	R-11	220 ohms 1/2 watt, carbon	25X20X221K
C-3	Trimmer Ass'y, antenna stage (Bands 1, 2 & 5)	44B381	R-12, 45	22,000 ohms 1/2 watt, carbon	25X20X223K
C-4	Trimmer Ass'y, antenna stage (Bands 3 & 4)	44B379	R-14, 48	150 ohms 1/2 watt, carbon	25X20X151K
C-5, 33, 34, 52, 57, 63, 68	220 mmf. 500 V., ceramic	47B30221K5	R-15, 48, 60	10,000 ohms 1 watt, carbon	25X20X103K
C-6, 10, 19, 67	2 x 4,000 mmf. 450 V., ceramic	47A218	R-17, 21, 25, 49, 52, 55	100,000 ohms 1/2 watt, carbon	25X20X104K
C-7	.25 mfd. 200 V., tubular	46AT254J	R-18, 26	270 ohms 1/2 watt, carbon	25X20X271K
C-8, 14, 38, 41, 58	100 mmf. 500 V., ceramic	47X20UJ101K	R-19, 27	33,000 ohms 1/2 watt, carbon	25X20X333K
C-9, 12, 17, 18, 21, 22, 23, 25, 26, 31, 64, 65	5,000 mmf. 450 V., ceramic	47A188	R-20	47,000 ohms 1 watt, carbon	25X20X473K
**C-11, 13	300 mmf. 500 V., mica	47X20B301J	R-22	1000 ohms 1/2 watt, carbon	25X20X102M
C-15	.47 mmf. 500 V., ceramic	47X20UK470K	R-23	6800 ohms 1/2 watt, carbon	25X20X682K
C-16, 20, 24, 30, 50	.05 mfd. 600 V., tubular	46AY503J	R-29	56,000 ohms 1/2 watt, carbon	25X20X563K
C-27	Trimmer, adjustable	44A047	R-31	680 ohms 1/2 watt, carbon	25X20X681K
C-28	Capacitor, variable CRYSTAL PHASING	46A182	R-32, 33	2700 ohms 1/2 watt, carbon	25X20X272K
C-29	88 mmf. 500 V., mica	47X20A330K	R-34, 35, 40	470,000 ohms 1/2 watt, carbon	25X20X474K
C-32	.25 mfd. 600 V., tubular	46AX254J	R-36	180,000 ohms 1/2 watt, carbon	25X20X184K
C-35	Trimmer Ass'y, mixer stage (Bands 1, 2 & 5)	44B382	R-37	82,000 ohms 1/2 watt, carbon	25X20X823K
C-36	Trimmer Ass'y, mixer stage (Bands 3 & 4)	44B380	R-38, 50, 59	220,000 ohms 1/3 watt, carbon	25X20X224K
C-37	15 mmf. 500 V., ceramic	47X20UJ150K	R-43	Resistor, variable, 500 ohms, 8-METER ADJUSTMENT	25C022
C-39	2.2 mmf. 450 V., ceramic	47A160-4	R-47	Resistor, 2500 ohms 10 watts, wirewound	24BG252D
C-40, 49	25 mmf. 500 V., ceramic	47X20UK250K	R-51	39,000 ohms 1/2 watt, carbon	25X20X393K
C-42	Trimmer Ass'y, oscillator stage (Bands 1 & 2)	44B383	R-53	Resistor, variable, 500,000 ohms, VOLUME control	25B604
C-43, 44, 45	Trimmer Ass'y, oscillator stage (Bands 3, 4, & 5)	44A378	R-54	15 megohms 1/2 watt, carbon	25X20X156K
**C-46	2200 mmf. 500 V., mica	47X30D222J	R-56	Resistor, variable, 500,000 ohms, TUNE control	25B589
**C-47	910 mmf. 500 V., mica	47X30D911J	R-57, 58	560 ohms 1 watt, carbon	25X30X561K
**C-48	1800 mmf. 500 V., mica	47X30D152G	R-61, 62	6.8 ohms 1 watt, carbon	25X30X068K
C-51	.1 mfd. 200 V., tubular	46AU104J	R-63	27,000 ohms 1/2 watt, carbon	25X20X273K
C-54	.02 mfd. 200 V., tubular	46AU303J	R-65	47,000 ohms 2 watts, carbon	25X40X473K
C-55	10 mmf. 500 V., ceramic	47X20UK100K	R-67	100 ohms 1/2 watt, carbon	25X20X101K
C-56	1 mfd. 50 V., electrolytic	45A163	TRANSFORMERS AND COILS		
**C-59	Capacitor, temperature compensator	44A158	T-1	Transformer, antenna stage, band 1	51B1088
**C-60	.01 mfd. 600 V., moulded	46X35X103M	T-2	Transformer, antenna stage, band 2	51B1089
C-61	60-20 mfd. 450 V., & 20 mfd. 400 V., electrolytic	45B113	T-3	Transformer, antenna stage, band 3	51B1090
C-62, 70	.01 mfd. 600 V., tubular	46AY103J	T-4	Transformer, antenna stage, band 4	51B1091
C-68	1 mmf. 450 V., ceramic	47A160-2	T-5	Transformer, antenna stage, band 5	51B1092
C-69	470 mmf. 500 V., mica	47X20B471J	T-6	Transformer, 1st IF (2.075 MC)	50C414
RESISTORS			T-7, 8	Transformer, 1st and 2nd IF (455 KC)	50C416
R-1, 30	10 ohms 1/2 watt, carbon	25X20X100K	T-9	Transformer, 3rd IF (455 KC)	50C418
R-2, 13	15 ohms 1/2 watt, carbon	25X20X150K	T-10	Transformer, FM detector	50C418
R-3, 41	1 megohm 1/2 watt, carbon	25X20X105K	T-11	Transformer, mixer stage, band 1	51B1093
R-4, 44	82 ohms 1/2 watt, carbon	25X20X820K	T-12	Transformer, mixer stage, band 2	51B1094
R-5	Resistor, variable, 10,000 ohms, SENSITIVITY control	25B582	T-13	Transformer, mixer stage, band 3	51B1095
R-6	8200 ohms 1/2 watt, carbon	25X20X822K	T-14	Transformer, mixer stage, band 4	51B1096
R-7, 39, 66	2.2 megohms 1/2 watt, carbon	25X20X225K	T-15	Transformer, mixer stage, band 5	51B1097
R-8	3300 ohms 1/2 watt, carbon	25X20X333K	T-16	Transformer, osc. stage, band 5	51B1160
R-9	330,000 ohms 1/2 watt, carbon	25X20X334K	T-17	Transformer, osc. stage, band 4	51B1101

* Used on universal model SX-71U only.

** Use exact replacement part only.

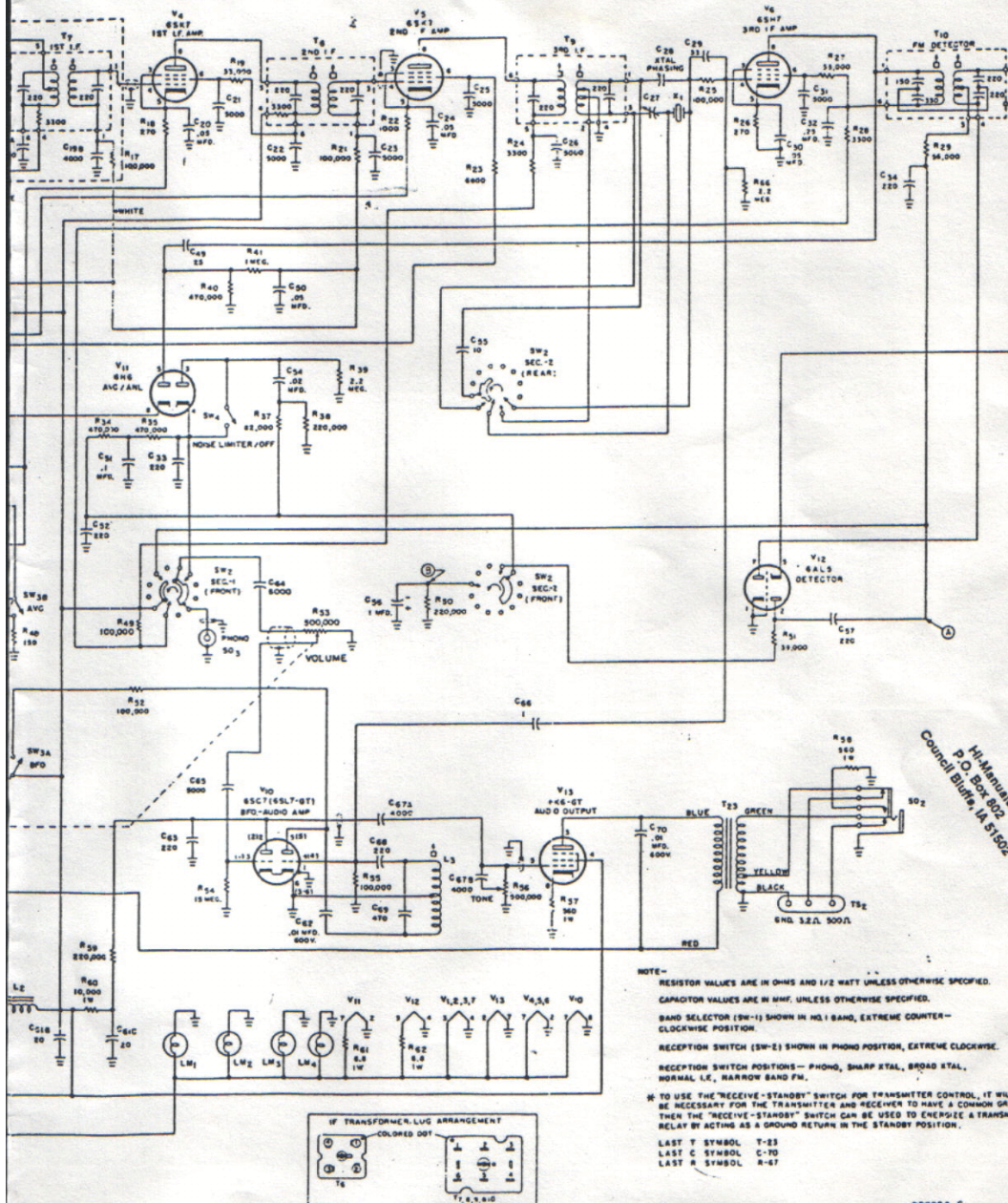
SERVICE PARTS LIST (Cont.)

Ref. No.	Description	Manufacturer's Part Number	Ref. No.	Description	Manufacturer's Part Number
TRANSFORMERS AND COILS (Cont.)			TUBES, RECTIFIERS AND LAMPS (Cont.)		
T-18	Transformer, osc. stage, band 3	51B1100	V-10	Type 6SC7, 1st audio amplifier and beat frequency oscillator	90X6SC7
T-19	Transformer, osc. stage, band 3	51B1099	V-11	Type 6SH, automatic volume control and automatic noise limiter	90X6SH
T-20	Transformer, osc. stage, band 1	51B1098	V-12	Type 6AL5, detector	90X6AL5
T-21	Transformer, 2.53 MC osc. stage, bands 3, 4 and 5	50C448	V-13	Type 6XGT, audio output	90X6XGT
T-22	Transformer, power	52C174	LM-2,3	Lamp, carrier level meter light GE #44	39A003
*T-22	Transformer, power (Universal)	52C175	LM-1,4	Lamp, main dial scale light GE #47	39A004
T-23	Transformer, output	55B120-C	MISCELLANEOUS		
L-1	Choke, RF	53A107	TS-1	Terminal strip, antenna	88A032
L-2	Choke, filter	55B107-B	TS-2	Terminal strip, speaker	88B572
L-3	Coil, BFO	54B039	M-1	Escutcheon, meter	7B124-D
SWITCHES				Meter, carrier level (5 ma)	82B166
SW-1	Switch, BAND SELECTOR Section 1 (Antenna stage) and Section 2 (Mixer stage)	62B061		Plate, dial drive mounting	83D415
	Section 3 (Osc. grid)	62B049		Bracket, pulley mounting	67A1140
	Section 4 (Osc. plate)	62B050		Pulley, small idler	28A078
	Section 5 (Converter plate and bias)	62B048		Pulley, large idler	28A079
SW-2	Switch, RECEPTION	60B343		Cord, dial	38A019
SW-3	Switch, BFO-OFF	60A285		Spring, dial cord	75A173
SW-4	Switch, NOISE LIMITER-OFF	60A138		Potator, bandspread and main tuning	82A160
SW-5	Switch, RECEIVE-STANDBY	60A139		Scale, dial	63D358-E
PLUGS AND SOCKETS				Window, dial	23B305-A
PL-1	Line Cord	87B1873		Plate, window support	63A450
PL-2	Plug, AC shorting	35A003		Flywheel, bandspread and main tuning	71A178
SO-1	Socket, POWER (DC operation)	68B290		Drum, bandspread and main tuning gang drives	28A080
SO-2	Jack, PHONES	36A038		Shaft, bandspread and main tuning pulley drives	74A296
SO-3	Jack, PHONE	66B048		Shaft, bandspread and main tuning gang drives	74A299
	Socket, octal (tube)	68B296		Ring, retainer, tuning assembly drive shafts	76A553
	Socket, octal (tube) with center shield	6A315		Ring, retainer, tuning assembly pulley shafts	76A551
	Socket, miniature	6A347		Washer, spring	4A043
	Socket, tuning dial scale lamps	66B092		Coupling, bandspread gang shaft	29A128
	Socket, carrier lever meter dial lamps	66B091		Coupling, main tuning gang shaft	29A123
TUBES, RECTIFIERS AND LAMPS				Shaft and index plate, band switch	74B267
V-1	Type 6BA6, RF amplifier	90X6BA6		Collar, band switch	77A055
V-2	Type 6AU6, 1st converter	90X6AU6		Lock, line cord	76A297
V-3	Type 6BE6, 2nd converter	90X6BE6		Knob, BANDSPREAD and MAIN TUNING	15A047
V-4,5	Type 6SK7, 1st and 2nd IF amplifiers	90X6SK7		Knob, CRYSTAL PHASING	15A087
V-6	Type 6SH7, 3rd IF amplifier	90X6SH7		Knob, CW FITCH	15A089
V-7	Type 6C4, oscillator	90X6C4		Knob, POWER-VOLUME, TONE and SENSITIVITY	15A097
V-8	Type VR-150/OD3, voltage regulator	90XVR-150/OD3		Knob, BAND SELECTOR	15B209
V-9	Type 5Y3GT, rectifier	90X5Y3GT		Knob, RECEPTION	15A212
			X-1	Foot, rubber	16A007
				Crystal, 455 KC	19A123

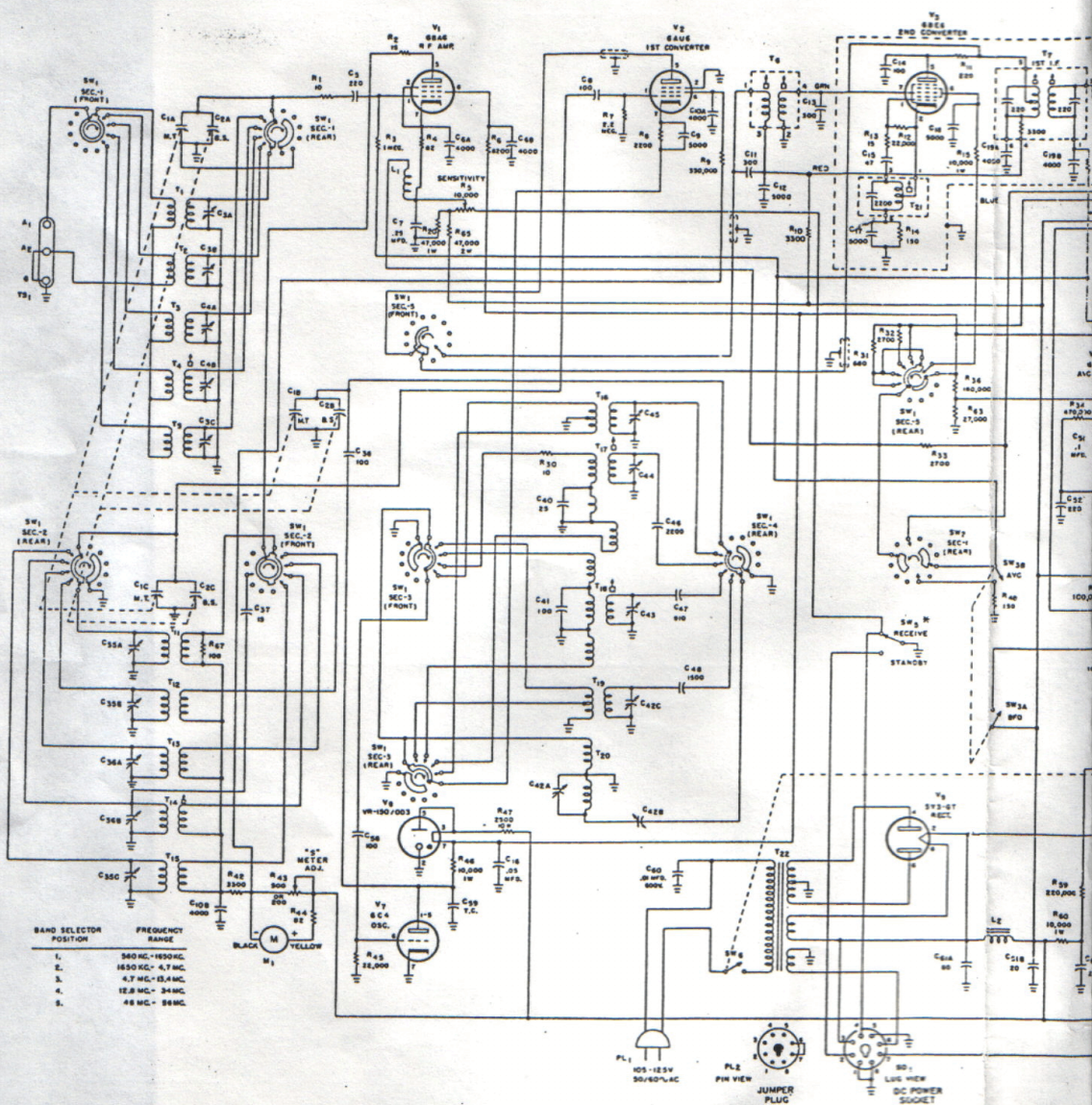
* Used on universal model SX-71U Only.

The Hallcrafters Co. reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.

MODELS SX-71 & SX-71U RUN 4



Hi-Manuals
P.O. Box 802
Council Bluffs, IA 51502



I-F ALIGNMENT PROCEDURE

EQUIPMENT REQUIRED: 1. Vacuum tube voltmeter (VTVM)
2. Signal Generator covering 455 KC and 2.075 MC
3. Output meter. (Use AC scale of VTVM)

It is necessary to remove the receiver chassis from the cabinet to make the I-F alignment. The chassis is held in the cabinet by two screws on the bottom rear and by screws on the side and bottom of the panel flanges.

The output meter should be connected between the 500 ohm speaker terminal and ground. The output of the receiver should be properly loaded by means of a speaker or dummy load. Speaker loading will enable the operator to monitor the signal.

The following adjustments were made with the VOLUME, TONE and SENSITIVITY controls fully clockwise, NOISE LIMITER switch at OFF, RECEIVE/STANDBY switch at RECEIVE, CRYSTAL PHASING control at zero and both dials set at 50 on the logging scale. With the CRYSTAL PHASING control set at zero, the capacitor plates should be half meshed. Refer to Figs. 11 & 12 for location of all adjustments.

Step	Signal Gen. Coupling	Signal Gen. Frequency	Receiver Control Settings	Receiver Dial Settings	Adjust	Remarks
*1	Connect gen. to stator of gang. (center section) through a .00025 mfd. capacitor.	455 KC No Modulation	BAND SELECTOR at 2. RECEPTION SWITCH at BROAD CRYSTAL. BFO switch at BFO.	Both dials set at 50 on the logging scale.	BFO Slug	Remove CW PITCH control knob and set shaft for a zero beat. Do not replace knob.
*2	Connect gen. to pin 4 of V-5 through a .00025 mfd mica capacitor.	455 KC (approx.) No Modulation	Adjust CW-PITCH for a 400-1000 cycle note. Other controls same as Step 1.	Same as Step 1	U	While turning the slug very slowly in one direction, slowly "rock" the signal generator. As the adjustment passes through the response of the crystal filter, the output goes through a maximum, dips down, and starts going up again. The correct setting of this slug is in the center of the observed dip. A swishing note, in contrast to the sharp crystal tone will be apparent when the correct adjustment has been reached.
*NOTE: The crystal filter I-F transformer secondary winding (adjustment U) is carefully adjusted at the factory to the frequency of the crystal. A signal generator which may be accurately set to within .25 KC of any frequency between 450 to 460 KC is required to make this adjustment. Since the average service signal generator will not meet this requirement, DO NOT attempt to make this adjustment unless a suitable signal generator is available. Start the I-F alignment with Step 3 when a standard type of signal generator is used.						
3	Same as Step 1	Crystal Frequency	RECEPTION SWITCH at SHARP CRYSTAL. Other controls same as Step 1.	Same as Step 1	Sig. Gen.	Adjust the generator frequency for maximum output. This will be the exact frequency of the crystal. A slight reduction in output will be noted when switching from BROAD to SHARP CRYSTAL.
4	Same as Step 1	Same as Step 3	Same as Step 1	Same as Step 1	BFO slug	Rotate shaft of C. W. PITCH control until a zero beat is obtained. Replace knob with zero in line with the panel index mark.
5	Same as Step 1	Same as Step 3 (Modulated)	RECEPTION SWITCH at NORMAL I.F. BFO switch at OFF. Other controls same as Step 1.	Same as Step 1	V W X Y Z 1 2	Maximum output Maximum output Maximum output Maximum output Maximum output Maximum output Repeat above steps for maximum gain.
6	Same as Step 1	Same as Step 3. Increase output to approx. 1000 microvolts.	RECEPTION SWITCH at NBFM. Other controls same as Step 1.	Same as Step 1	3	Connect the test circuit shown in Fig. 10 to test points (A) and (B). Adjust core (3) for a zero reading between a positive and negative peak.
7	Same as Step 1. To prevent a spurious indication, keep the generator output as low as possible.	2.075 MC Modulated	RECEPTION SWITCH at NORMAL I.F. BAND SELECTOR at 4.	Same as Step 1	4 5 6 6	Until a signal is heard. Maximum output Maximum output Repeat above steps for maximum gain.

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointers of the main tuning and bandsread dials turn the tuning gangs fully closed and set pointer to 0 reference mark on the logging scale.
Set the tone control to maximum. Sensitivity control to maximum. Volume control to maximum. Noise limiter switch to "off" position, and Receiver- Standby switch to receive position.

IF ALIGNMENT

Before attempting step 5 connect two matched 100K Ω ($\pm 1\%$) resistors in series from point A to chassis. The junction of these two resistors is alignment point B as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	Direct	High side to stator of middle section of main tuning gang. Low side to chassis.	455KC (Unmod.)	Band 2	Both dials at 50 on logging scale.	Across voice coil		Turn reception switch to broad crystal, and BFO switch to BFO. Remove the knob from "CW" pitch control and adjust shaft for zero beat. Replace knob with zero at index line.
2.	Direct	"	"	"	"	"	A1	Adjust "CW" pitch for 1000G note. Rock the signal generator while turning the slug very slowly in one direction. As the adjustment is made, the output goes thru a maximum, dips down and goes up again. The correct setting of the slug is at the center of the dip.
3.	Direct	"	"	"	"	"		Turn the reception switch to "sharp crystal" position and set the signal generator frequency for maximum output on the crystal frequency.
4.	Direct	"	455KC (400 % Mod.)	"	"	"	A2, A3, A4, A5, A6, A7, A8	Turn reception switch to "Normal IF" position. BFO switch to "OFF" position. Adjust for maximum output.
5.	Direct	"	455KC (Unmod.)	"	"	Use VTVM. DC Probe to Point A. Common to Point B.	A9	Turn reception switch to NBFM position. Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
6.	Direct	"	2.075MC (400 % Mod.)	Band 4	"	Across voice coil	A10, A11, A12	Turn the reception switch to "Normal IF" position. Adjust A10 until a signal is heard. Adjust A-11 and A12 for maximum output. Repeat until no further improvement can be made.

RF ALIGNMENT

Connect a jumper between "A2" and "G" terminals of the antenna terminal strip.
Set the bandsread dial at 100 on the logging scale for all steps except step 16. In step 16 the main tuning dial should be set at 100 on the logging scale.
Turn the reception switch to "normal IF" position and the "BFO" switch to "BFO" position.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
7.	300 Ω carbon res.	High side to antenna terminal "A1". Low side to chassis.	1500KC	Band 1	1500KC	Across voice coil	A13, A14	Adjust A13 until a signal is heard. Adjust A14 for maximum output.
8.	"	"	600KC	"	600KC	"	A15	Adjust for maximum output.
9.	"	"	1500KC	"	1500KC	"	A16	Adjust until a signal is heard. Repeat steps 7, 8 and 9 until no further improvement can be made.
10.	"	"	4MC	Band 2	4MC	"	A17, A18, A19	Adjust A17 until signal is heard. Adjust A18 and A19 for maximum output. Repeat until no further improvement can be made.
11.	"	"	12MC	Band 3	12MC	"	A20 $\frac{H}{I}$	Adjust until signal is heard.
12.	"	"	5.2MC	"	5.2MC	"	A21 $\frac{I}{J}$	"
13.	"	"	12MC	"	12MC	"	A20, $\frac{H}{J}$, A22, $\frac{J}{K}$, A23 $\frac{K}{L}$	Adjust for maximum output while "rocking" tuning gang. Repeat steps 11, 12 and 13 until no further improvement can be made.
14.	"	"	30MC	Band 4	30MC	"	A24	Adjust until signal is heard.
15.	"	"	14MC	"	14MC	"	A25, A26, A27, A28, A29,	Adjust A25 until signal is heard. Adjust A26, A27, A25, A28 and A29 for maximum output while "rocking" tuning gang. Repeat steps 14 and 15 until no further improvement can be made.
16.	"	"	54MC	Band 5	Bandsread dial at 54MC	"	A30, A31, A32	Adjust A30 until signal is heard. Adjust A31 and A32 for maximum output while "rocking" the tuning gang. Repeat until no further improvement can be made.